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Then the pure blue, that swells autumnal skies,
Ethereal played; and then, of sadder hue,
Emerged the deepened indigo, as when
The heavy-skirted evening droops with frost;
While the last gleamings of refracted light
Died in the fainting violet away."

That these beautiful colors, which God himself placed within the heavens as a symbol of his good will to man, contained more than a poetic meaning, that within them lay a language from the heavens that needed but an inspired interpreter to reveal, has been amply demonstrated by the life's labor of our medalist, Sir WILLIAM HUGGINS.

And in his absence, Mr. Secretary, I shall charge you with the mission of sending the medal to Sir WILLIAM, with our best wishes that he may live to see more years in which to enjoy the fruits of his accomplished work so modestly and unselfishly given to the world.

If our imagination can create the spectrum of a man's life, may his be to the end one crossed by bright lines only.

March 26, 1904.

PHOTOGRAPHS OF BORRELLY'S COMET (1903 *c*).

BY SEBASTIAN ALBRECHT.

It is aimed in this paper to give a brief account of thirty-six negatives of Comet 1903 *c* (BORRELLY), obtained at Mount Hamilton between June 22d and August 18th, inclusive.*

Two distinct types of tails persist throughout the entire series of photographs. The principal tail is long and straight in its general direction, and in a large number of cases can be traced to the edge of the plate, a distance of ten degrees. It developed some very interesting forms, changing its aspect completely from day to day. Several more or less permanent features of the main tail deserve special mention. Its length was always considerable, and it was directed almost exactly away from the Sun. The mean deviation of the tail from the

* A more complete account, with tables of measures and descriptions of the negatives, is published in *L. O. Bulletin* No. 52, and in the *Astro-Physical Journal* March, 1904.



1903. July 23



1903. July 24

COMET 1903 c, [BORRELLY]

radius vector from the comet to the Sun was somewhat less than two degrees. The main tail, in general, widens out after leaving the head, and on a large number of plates divides into two distinct branches. From measures of the directions of the two branches of the main tail on eight plates, the mean angular distance between them was found to be about seven degrees. There is a marked contrast in the appearance of the primary tail on the negatives taken in July and on those taken in August. The tail on the plates of July is, with three exceptions, which will be mentioned later, smooth and continuous, while on the August plates it is twisted and full of condensations, indicating greatly increased activity as the comet approached perihelion.

The other tail is short and very much curved, and presents practically the same appearance on all the negatives. It is bright even on the plates of June. Its length is about one and one half degrees. In the process of intensification necessary to reproduce the principal features of the primary tail, the coma has become so strongly intensified as to almost completely obscure the secondary tail. This is especially true for the plate of July 23d, where barely a trace of the short tail can be seen on the side opposite the new tail which appears on that plate. On the plate of June 22d the short tail made an angle of twenty-six degrees with the primary tail. This angle gradually diminished, owing to the foreshortening produced by the Earth's approach to the plane of the comet's orbit, until about the middle of July, when the two tails appeared to coincide. After the passage of the Earth through the plane of the orbit, the angle again increased until August 18th, when it amounted to thirty-three degrees.

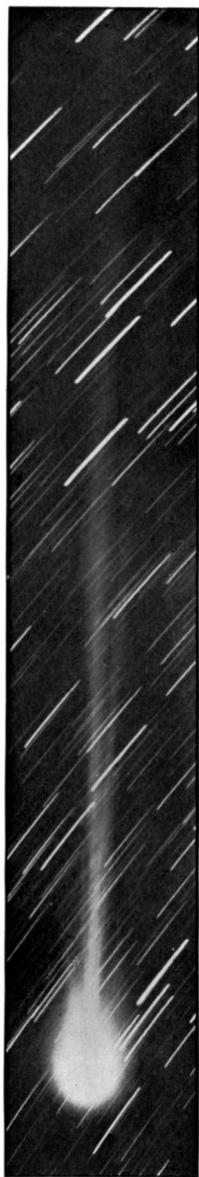
In addition to these two tails, occasional streamers developed, some of which branched off from the main tail, while others issued directly from the head.

Three of the negatives, those of July 23d, 24th, and 26th, deserve special mention, on account of unusual structure in the principal tail. The plate of July 23d shows two long masses entirely separated from the main tail at about three and one half degrees from the nucleus, and on the side following the radius vector. One of these extends to the edge of the plate, a distance of about ten degrees from the head. The main tail

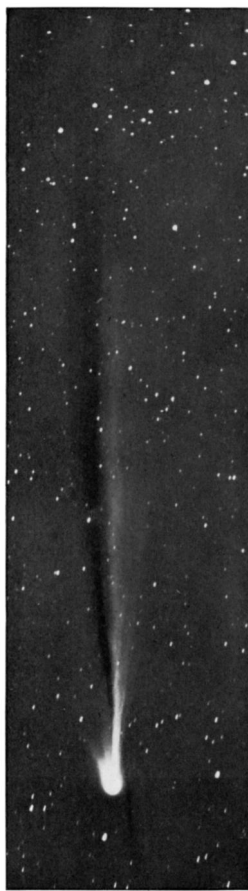
extends to a distance of about five degrees from the head, and a long, narrow streamer leaves it about two degrees from the head. These four branches, together with two prominent bands in the main tail near the head, all making small angles with the general direction of the tail, present a wavelike appearance. The entire main tail somewhat resembles a rope, one end of which is unraveled and which has two of the loose strands severed.

The plate of July 23d shows, in addition, an entirely new tail issuing from the head in advance of the radius vector, preceding it by six degrees, but being bent toward the radius vector shortly after leaving the coma. This tail assumes the forked characteristic which the main tail shows on a majority of the plates. Its angular width is 4.6 degrees, and on the original negative it can easily be traced to a distance of four degrees from the head. The plate of July 24th does not record this extra tail. The plate of the 24th shows a detached section, preceding the radius vector, which is composed of two distinct portions, the shorter being nearer the head and pointing directly toward it. This can best be seen in the accompanying illustration by holding it obliquely, so that the eye is raised only slightly above the plane of the paper. This plate also records a detached streamer on the following side of the main tail, and directly opposite the detached section referred to above. The interval from the 23d to the 24th of July was evidently one of unusual activity. The plate of July 25th shows no unusual forms. The plate of July 26th shows the main tail broken at a distance of about three and one half degrees from the head.

From a comparison of the plate of July 24th with reproductions of two plates taken by BARNARD and WALLACE at the Yerkes Observatory and one by QUENISSET at Nanterre, it was found that, in the interval of seven hours during which these photographs were taken, the detached section of the primary tail was receding from the nucleus at an average rate of thirty-five miles per second, which is equivalent to thirteen miles relative to the Sun.



1903. July 25



1903. August 12

COMET 1903 c, [BORRELLY]